Intelligent True On-Line UPS
For Corporate and IT Users

User Manual

1, 2, and 3 kVA

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1. Safety and Storage Instructions

1.1. *Safety*

1. Do not open the case as there are no serviceable parts inside. Opening the case will void your warranty and introduces the risk of electric shock.
2. Do not try to repair the unit yourself. Doing so will void your warranty. Contact your local supplier for repairs.
3. If liquids are spilt onto the UPS or foreign objects dropped into the unit the UPS could be damaged, users could be subject to electric stock, and the warranty will become null and void.
4. Do not install the UPS in an environment with sparks, smoke, or hazardous gas.
5. This UPS is equipped with an EMI filter. To prevent potential leakage current hazards ensure that the AC mains supply is securely grounded.
6. This UPS is designed to be installed and commissioned in a sheltered, controlled environment as follows:
   - Operating temperature 0-40°C and 0-90% relative humidity. High ambient temperature reduces battery life.
   - Avoid direct sunlight.
   - Don not install the UPS in an inflammable or otherwise hazardous environment.
   - Avoid vibration and areas subject to physical impact.
   - Avoid any area with sparks.
   - Dusty, corrosive, and salty environments can damage any UPS.
   - Install the UPS indoors as it is not designed for installation outdoors.
7. To prevent overheating of the UPS keep all ventilation openings free from obstruction, and do not place anything on top of the UPS. Keep the UPS rear panel 20 cm away from the wall or other obstructions.
8. Install the UPS in a ventilated area, ideally exchanging 5 m^3 of air per hour, because the chemical reaction during battery charging causes trace gas production. If the batteries suffer breakage electrical arcing could occur in the UPS interior.
9. If the product emits a strange noise or smell please immediately stop using the product and contact your dealer for maintenance.
10. Always switch off the UPS and disconnect the batteries when relocating the UPS. Be aware that, even when disconnected, charged batteries present a possible electric shock hazard.
11. The UPS should be recharged every 2-3 months if unused. If this is not done then the warranty will be null and void. When installed and being used the batteries will be automatically recharged and kept in top condition.

12 Make sure that the AC utility outlet is correctly grounded.

13. Ensure that the input voltage of the UPS matches the utility supply voltage. Use a certified input power cable with the correct plugs and sockets for the system voltage.

1.2. *Storage*

If the UPS is unused for an extended period of time it must be stored in a moderate climate. The batteries should be charged for 12 hours every three months by connecting the UPS to the utility supply and switching on the input breaker located on the UPS rear panel. Repeat this procedure every two months if the storage ambient temperature is above 25°C.

2. Product Introduction

2.1. *General Characteristics*

1. True on-line technology continuously supplies your critical device with stable, regulated, transient-free, pure-sine-wave AC power.

2. High-efficiency PWM sine-wave topology yields excellent overall performance.

3. The high crest factor of the inverter handles all high in-rush current loads without the need to upgrade the power rating.

4. User-friendly plug-and-play design allows hassle-free installation.

5. Built-in maintenance-free, sealed batteries minimize the need for after-sales service.

6. To protect the unit from overloading, the UPS will automatically switch to bypass mode in 30 seconds if loading is at 105% of rated capacity. It will automatically switch back to inverter mode once the overload condition ceases.

7. Should the output become short-circuited the UPS puts the system in stand-by mode, provides visible and audible alarms, and cuts the output supply automatically until the short circuit situation is resolved manually.

2.2. *Special Features*

1. Our High Frequency Transformer-less technology and tower-convertible enclosure enables the UPS to be integrated into even the most difficult environments with space constraints.

2. This UPS is equipped with fully digital control logic for greater functionality and enhanced power protection. Digital signal processing (DSP) also provides the UPS with powerful communication capability, which simplifies remote control and monitoring.

3. Our wide input voltage tolerance of 110-300 V allows under-voltage or over-voltage correction without unnecessary battery drain and helps extend battery life.

4. Our DC-start function ensures the start-up of the UPS even during power outages.

5. Our smart battery management system extends the batteries' life span.

6. Our Active Power Factor Correction control function constantly maintains the UPS input power factor at > 0.98 for superb energy efficiency.

7. Our Selectable Bypass input voltage tolerance (sensitivity low/high) prevents under- or over-voltage being supplied to the loads in Bypass mode. The selectable voltage ranges are (i) Bypass Sensitivity Low: many selectable output voltages ±15% and (ii) Bypass Sensitivity High: many selectable output voltages ±10%. For example, if the output voltage setting is 230 V the Bypass Sensitivity Low range is 230 V ±15%, i.e., 195.5-264.5 VAC.

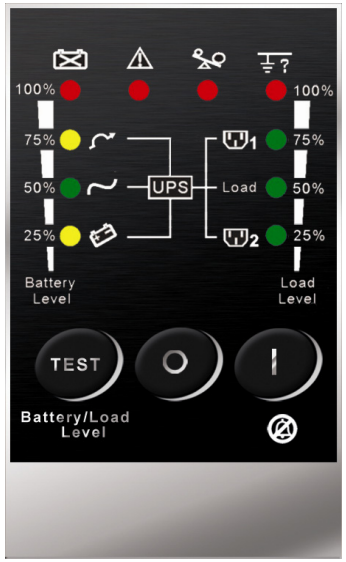
8. The UPS provides numerous configurable output voltages to match various system voltages.

9. The UPS is designed to comply with various stringent international standards for electromagnetic interference compatibility (EMC).

3. UPS Functional Descriptions

3.1. *Front Panel Display*

3.1.1. LED Panel (Standard)

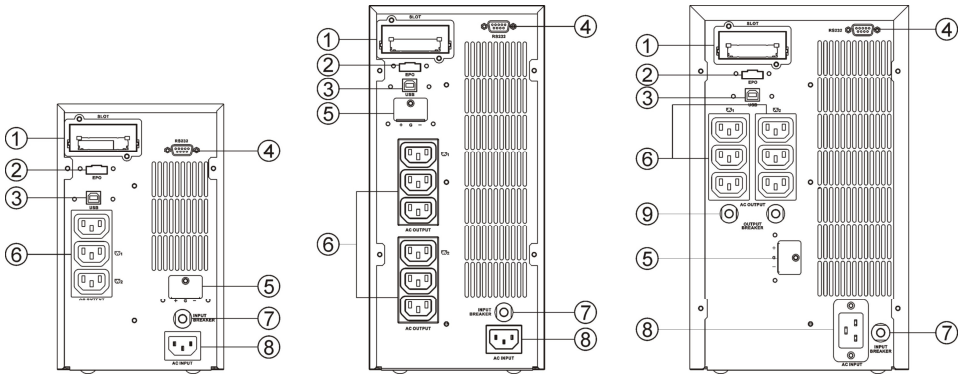


Control Key	Symbol	Description
ON		a. UPS Power-On Switch (Press and hold until the buzzer beeps.) b. Alarm silence c. Error Code Display Function Mode After an alarm, press to mute the alarm buzzer and show an Error Code. (Do not hold for > 1 second.)
OFF		UPS Power-Off Switch (Press and hold until the buzzer beeps.)
Self-Test		a. Commands the UPS to perform self-testing (Press and hold until the buzzer beeps.) b. Battery and Load Display Function Mode (Do not hold for > 1 second.)
◎ Manual Bypass		Press the "ON" key and "Self-Test" key simultaneously for three seconds to transfer from "Inverter to Bypass" (The bypass LED will continuously blink and the buzzer will beep intermittently.) or "Bypass to Inverter" when the UPS is in on-line mode and the Bypass Voltage Window is Normal.

LED Indicator	Symbol	Description
Normal Mode LED	~	1. Solid indicates normal utility voltage. Blinking indicates insufficient utility voltage for the full load. Off indicates abnormal utility voltage. 2. In Battery and Load Function Mode indicates battery capacity is 50%.
Battery Mode LED		1. Indicates load supplied by battery power. 2. In Battery and Load Function Mode indicates battery capacity is 25%.
Bypass Mode LED		1. Indicates load supplied by bypass. 2. In Battery and Load Function Mode indicates battery capacity is 75%.
Battery Bad/Weak LED		1. Indicates low battery power or faulty battery bank. 2. In Battery and Load Function Mode indicates battery capacity is 100%.
Fault LED	⚠	1. Solid indicates fault or abnormal condition. 2. Blinking indicates LED Panel in Error Code Function Mode.
Overload LED		1. Indicates UPS is overloaded. 2. In Error Code Function Mode indicates Error Code 16.
Site wiring fault LED	?	1. Indicates live and neutral lines are connected wrongly or high neutral-ground voltage. 2. In Battery and Load Function Mode indicates load capacity is 100%. 3. In Error Code Function Mode indicates Error Code 8.
Outlet1 LED	1	1. Indicates UPS Outlets 1 are enabled and ready to supply loads. (This function is optional.) 2. In Battery and Load Function Mode indicates load capacity is 75%. 3. In Error Code Function Mode indicates Error Code 4.
Load LED	Load	1. Indicates UPS outlets are enabled and ready to supply loads. 2. In Battery and Load Function Mode indicates load capacity is 50%. 3. In Error Code Function Mode indicates Error Code 2.
Outlet2 LED	2	1. Indicates UPS Outlets 2 are enabled and ready to supply loads. (This function is optional.) 2. In Battery and Load Function Mode indicates load capacity is 25%. 3. In Error Code Function Mode indicates Error Code 1.

3.2. *Rear Panel*

230V

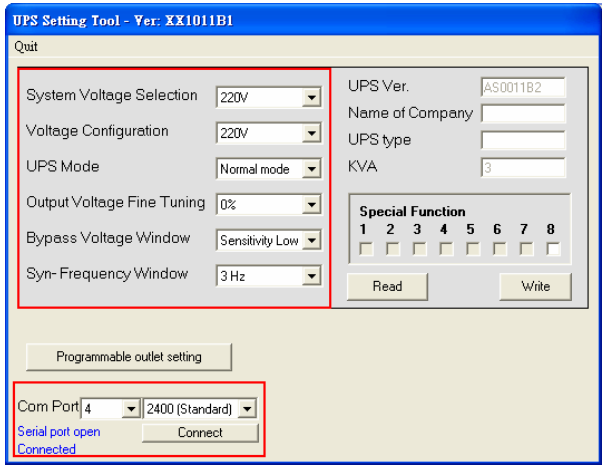


1. Slot for optional communication cards*
2. Emergency Power Off (EPO) dry contact signal inputs*
3. USB port*
4. RS-232 port
5. External battery connector*
6. AC outlets
7. Utility input circuit breaker
8. AC power connection socket
9. Output circuit breaker for two outlets

Note : This function is optional

3.3. *Operating Modes and System Voltage Configurations*

Download and open the “UPS Setting Tool” software to see the window below.



3.3.1. System Configuration Settings

1. System Voltage Selection: Select input voltage 220 V.
2. Voltage Configuration: Select UPS output voltage: 200/208/220/230/240 V.
3. UPS Mode: Select mode: Normal/CF50*/CF60*.
4. Output Voltage Fine Tuning: Output voltage regulation from 0 to ±3%
5. Bypass Voltage Window: Sensitivity Low/Sensitivity High

	230 V System Bypass Output
Sensitivity Low	Many Selectable Output Voltages ±15%
Sensitivity High	Many Selectable Output Voltages ±10%

6. Syn-Frequency Window: Select 3 Hz/1 Hz Inverter Frequency synchronizing range
7. Com Port: Select the COM port of an attached PC.
8. Click on “Write” to confirm the configuration settings. The UPS will beep twice to acknowledge a successful change.
9. Turn off the UPS after changing settings to make sure that the new values are written into EEPROM successfully, then restart the UPS to enable the new settings.

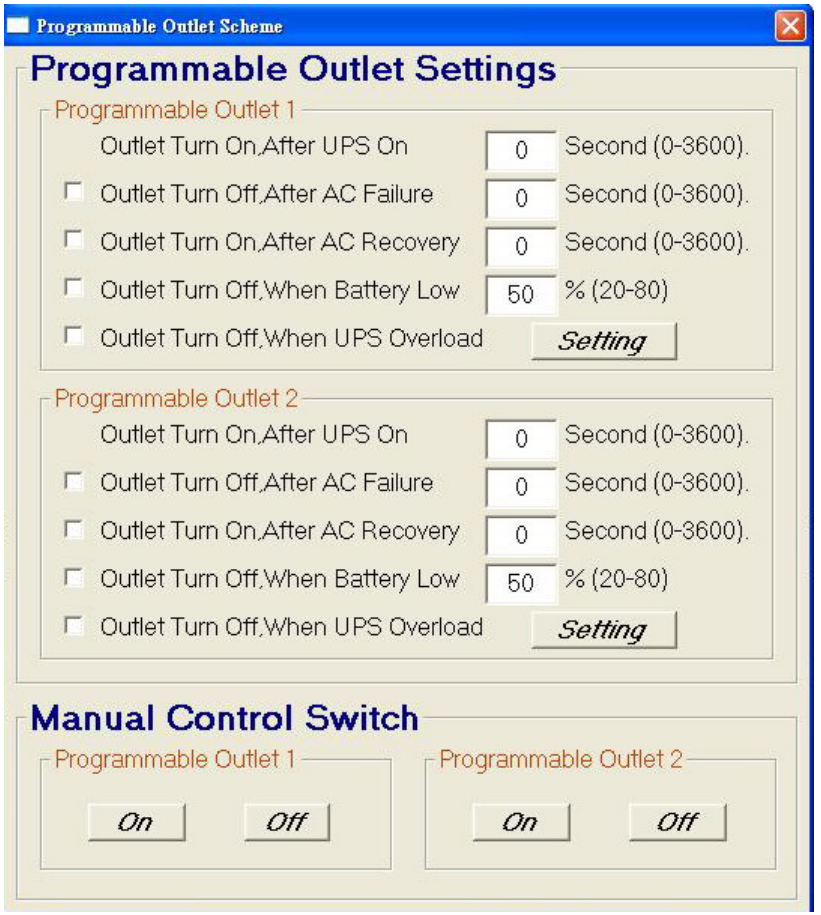
Note:

***CF50/CF60 = Frequency Converter mode 50 to 60 Hz or vice versa**

3.3.2. Programmable outlet setting

The UPS is equipped with 2 programmable outlets for use to supply to less critical loads. These outlets can be disabled to shed the less critical loads during back-up modes or overload conditions to maintain quality power supply to the more critical loads connected to the UPS.

Click on the “Programmable outlet setting” bar to enter to the setting screen as shown below.



1. Outlet Turn On After Turn on UPS – *select the time to automatically enable this outlet within the specified time when the UPS is powered on. If "0" sec is selected, the outlet will be enabled once the UPS is powered on*.

2. Outlet Turn Off After AC Failure – *select this option to automatically disable the outlet within the specified time after utility outage to shed the less critical loads to provide longer battery back-up time for the other more critical loads connected to the UPS.*

3. Outlet Turn On After AC Recovered – *select this option to automatically enable the outlet within the specified time after the utility is restored.*

4. Outlet Turn Off When Battery Lower than - *select this option to automatically disable the outlet at the specified remaining battery power capacity(%) during battery mode to shed the less critical loads to prolong battery back-up time for the other more critical loads connected to the UPS.*

5. Outlet Turn Off When Overload – *select this option to automatically disable the outlet during overload condition (bypass mode) to possibly allow the more critical loads:*
   a) To be continually supplied via Bypass without shut down

6. You have to select the "Setting" menu to configure new parameters. The calibration is confirmed successfully after the UPS beeps twice. Turn off the UPS and remove the input source to make sure that those new parameters are written into EEPROM successfully, then re-start the UPS to enable the new settings.

7. Manual Control Switch – Click "On" or "Off" to manually enabled or disabled the programmable outlets, overriding all previous settings.

3.4. *Communication Port Explanation*

The UPS is equipped with a true RS-232 communication port as standard to provide communication with bundled UPS monitoring software for remote monitoring of the UPS status using a PC.

In addition, there are six optional interface cards available to meet various communication needs: USB, EPO, DCE (dry contact relay card), R2E, USE, and an SNMP/Web card. (Please see Chapter 8.)

The software bundled with the UPS is compatible with many operating systems, including Windows 98 / Me / NT / 2000 / 2003 / XP / Vista / 2008 / 7, Novell, NetWare, Unix, Linux 2.6.x, Mac OS X v10.5 Leopard, Mac OS X v10.6 Snow Leopard please contact your local dealer for suitable software.

All communication ports including optional cards can be active and used simultaneously to monitor the UPS status. However, only one communication interface at a time (the one with the highest priority) can control the UPS. The priorities of these communication interfaces are as follows (highest priority first).

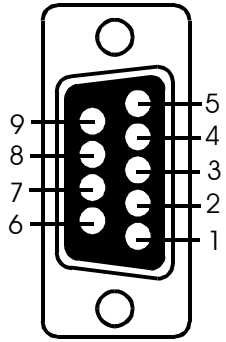
1) Optional EPO input port
2) Optional interface card
3) Optional USB
4) RS-232

3.4.1. True RS-232

The RS-232 interface must be configured as follows.

Baud Rate	**2400 bps**
Data Length	**8 bits**
Stop Bit	**1**
Parity	**None**

Pin Assignments:



Pin 3: RS-232 Rx
Pin 2: RS-232 Tx
Pin 5: Ground

4. Installation and Operation

Please read the Safety Instruction guide (pages 2 and 3) before installing the UPS.

4.1. *Unpacking*

Inspect the UPS upon receipt. The packaging is robust, but accidents and damage may still occur during shipment. Notify the forwarder and dealer if there is damage.

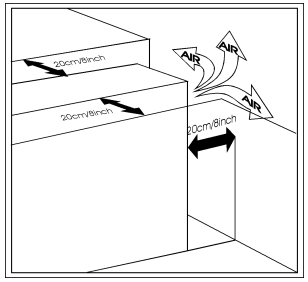
The packaging is recyclable and reusable.

1. After removing the packing foam please be careful handling the UPS while it is still in the plastic bag. The plastic is slippery, and the UPS could fall and injure your feet.
2. Check for the following standard package contents, in addition to the UPS itself.
   - **A. User Manual**
   - **B. IEC output cables (for UPS with IEC sockets only)**
   - **C. IEC input cables(for UPS with IEC sockets only)**

4.2. *Selecting Installation Position*

The UPS is heavy. Select a location sturdy enough to support the UPS weight.

To ensure proper operation and long operating life, position the UPS according to the following requirements.



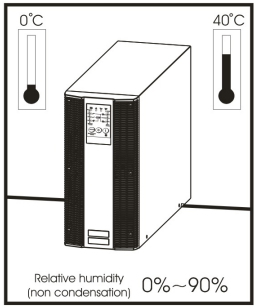
1. Keep at least 20 cm (8 inches) of clearance beyond the rear panel of the UPS.

2. Do not block the air flow to the ventilation louvers of the unit.

3. Ensure that the installation site is free from excessive dust and the ambient temperature and humidity are within the specified limits.

4. Do not place the UPS in a dusty or corrosive environment or near any flammable objects.

5. This UPS is not designed for outdoor use.



4.3. *Operation*

4.3.1. Using the standard LED panel

4.3.1.1 Start Up in Normal AC Mode

1. Before commencing ensure that the grounding is connected properly.
2. Ensure that the utility voltage matches the input voltage window of the UPS.
3. Connect the UPS main power cord into the utility AC power source receptacle.
4. Switch on the AC power source. All of the LEDs on the front panel display will flash once after five seconds. At the same time, the fan at the front of the UPS will start operating.
5. Press and hold the ON button ‘ ’ for approximately one second to start the UPS. The buzzer will beep and the LED indicators " " ," ","and " " will shine after 1-5 seconds. The start-up procedure is now completed, and the UPS outlets are ready to supply power to the load.
6. It is advisable to perform a battery mode test before connecting the loads to the UPS to ensure that the batteries are working properly. To do this, switch off the AC power source when the UPS is on. The LED on the front panel display will turn off, the LED will shine, and the buzzer will pulsate, indicating that the UPS is in Battery Mode. Connect a non-critical load to the UPS outlets to confirm that the batteries are supplying power. Repeat the test by switching on and off the AC power source to ensure that the UPS is functioning properly.

4.3.1.2 Start-up in Battery Mode (Cold Start)

This UPS can be switched on without the presence of an AC power source.

Press and hold the ON button ‘ ’ until the buzzer beeps. Release and then within the next 10 seconds press and hold the same button a second time. The UPS will perform its start-up procedure. The LEDs "" ,"","and "Load" will shine after 1-5 seconds, and the buzzer will pulsate to indicate successful power-on.

Note: Ensure that the UPS batteries are pre-charged for at least four hours by simply connecting the AC power cord to the utility receptacle.

4.3.1.3 Shutdown

1. Shutdown in AC Mode

Press and hold the OFF button ‘ ’ for five seconds until the buzzer beeps. The UPS will cut the power supply to the outlets. The ventilating fans will continue to operate. Switch off the AC power source. The ventilating fans will stop. The UPS is now completely shut down.

2. Shutdown in DC Mode

Press and hold the OFF button ‘ ’ for five seconds until the buzzer beeps. The UPS will cut the power supply to the outlets. The LEDs will turn off, and the ventilating fans will stop after ten seconds and the ±BUS discharge is below 42 V. The UPS is now completely shut down.

4.3.1.4 Self Testing in AC Mode

After the UPS has been successfully started in AC mode, press and hold the Self-Test button ‘TEST Battery/Load Level’ for five seconds until the buzzer beeps. The LED will shine to indicate that the self-test is in progress. When the self-test is completed the UPS will return to AC mode. If there were no faults or abnormal conditions then the and LEDs will turn off.

Note: The main function of self testing is to run a discharge test on the batteries.

4.3.2. Beep Codes

The following table contains common UPS statuses with their beep codes.

UPS Status	Beep Code
UPS faulty, Inverter shut down. All functions inhibited.	Long Continuous Beep
Control keypad error	Long Continuous Beep
UPS faulty, loads continue to be supplied via Inverter or Bypass.	Single beep every two seconds
In battery mode	Single beep once per second
Battery low	Quick and short successive beeps
Confirm RS-232 port receiving	two quick and short beeps
Service mode okay	one quick and short beep

5. UPS Operation Under Various Conditions

5.1. *UPS System Block Diagram*

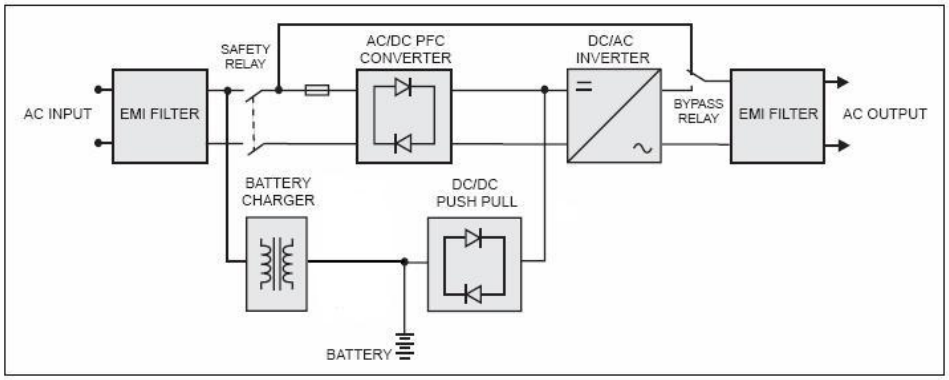


Figure 5.1

Figure 5.1 illustrates the True On-Line Double Conversion architecture of the UPS system. The major modules consist of:

1) An AC-to-DC power converter (rectifier) with PFC control circuit
2) A DC-to-AC high frequency inverter
3) An intelligent battery charger
4) A bank of stationary, maintenance-free batteries
5) A DC-to-DC push/pull converter control circuit
6) A static bypass loop
7) Input and output EMI filters

The table below provides a summary of the UPS operating modes under various utility AC power source and battery conditions.

Utility Condition	UPS Operating Mode	LEDs
Normal	Working power starts after approximately 5 seconds, LEDs on the panel will blink and fans will start. Press the ON button for 1-5 seconds. The UPS starts up normally.	~ 、1 、2 and Load LEDs remain lit
Abnormal (under or over voltage or absent)	Rectifier and charger stop operating. Battery discharges via DC-DC boost circuit and supplies Inverter. Loads continue to receive supply from Inverter. Alarm buzzer beeps. UPS now in battery mode.	~ LED off, LED illuminated
Utility abnormal or absent, or battery voltage low	Rectifier and charger stop operating. Battery discharges via DC-DC boost circuit and supplies Inverter. Alarm buzzer beeps quickly, indicating battery power low and Inverter may stop supplying soon.	~ LED off, and ⚠ LEDs illuminated

Sections 5.2-5.7 below provide detailed descriptions of the UPS operating modes.

5.2. *When Utility is Normal*

The operating mode of the UPS under normal utility conditions is illustrated as follows.

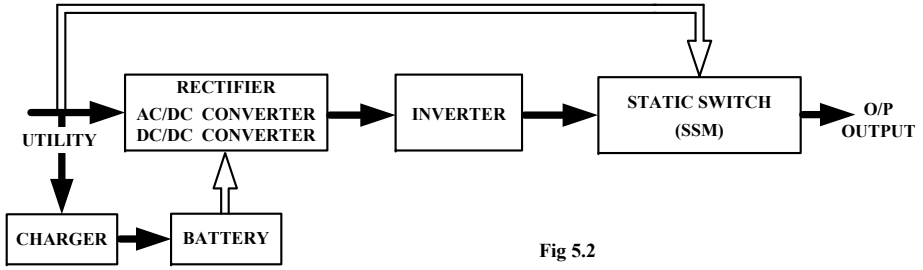


Fig 5.2

When the utility is normal the AC source is rectified to DC and fed into the charger to charge the batteries and partially fed into the inverter. The inverter reverts the DC to a cleaned and pure AC to supply energy to the load connected. The ~ 、1 、2 and Load LEDs shine.

5.3. *When Utility is Abnormal or Absent*

The operating mode of the UPS under abnormal utility conditions is illustrated as follows.

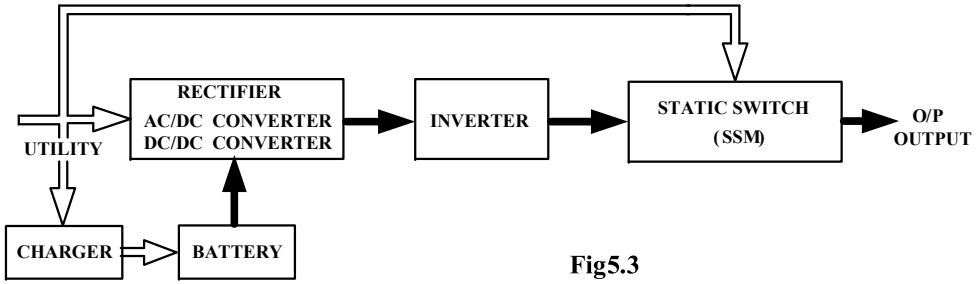


Fig5.3

1. When the utility is abnormal the UPS will direct the battery energy automatically to the Inverter without delay and turn off the charger and AC/DC converter. The inverter reverts DC to AC to supply energy to the output load connected without interruption. The LED will shine.

2. When the utility returns to normal the UPS will turn on the AC/DC converter, turn off the DC/DC converter, and switch the charger to charging mode. This is the same operating mode as in Figure 5.2.

3. During a utility outage the UPS will work as illustrated in Figure 5.3. When the batteries are low the buzzer will beep continuously until the batteries are completely cut off. The low-battery protection of the UPS will cut off the battery supply at a preset threshold to avoid over-draining the batteries.

4. The UPS will restart automatically when the utility is available, with the same status as in Figure 5.2.

5.4. *Overload Condition*

The operating mode of the UPS when overloading occurs is illustrated as follows.

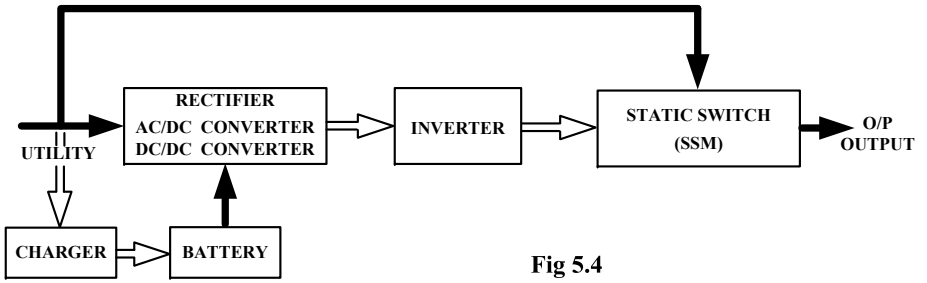
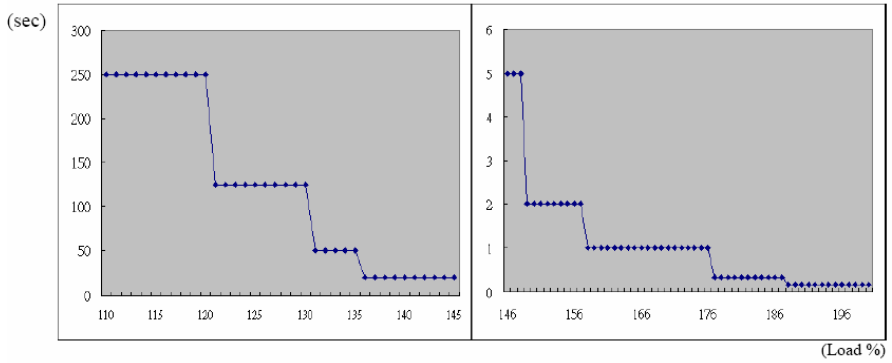


Fig 5.4

1. Generally, modern electronics and IT equipment generate an inrush current when switching on. The amount of inrush current varies from equipment to equipment, sometimes as high as six times rated capacity, other times negligible. To prevent severe damage to its inverter caused by the inrush produced by the loads, the UPS is equipped with an electronic overload-protection feature as standard. If the UPS is loaded over 150% of capacity it will switch into bypass mode until the load is less than 105%. Then the UPS will switch back to Inverter mode automatically.

2. The UPS Bypass loop is also equipped with overload protection. Its overload capacity is illustrated by the graphs and table below.



Load (%)	110~120	121~130	131~135	136~145	146~148	149~157	158~176	177~187	188<
Delay Time (Sec)	250	125	50	20	5	2	1	0.32	0.16

5.5. *Inverter Failure*

Output load short circuit when supplied via inverter

If the output load is short-circuited while supplied via inverter, the UPS will shut down the inverter automatically and cut the supply to the loads. The Fault LED will shine, and the buzzer will beep continuously. The UPS will not switch on automatically after the short-circuit condition is eliminated. The UPS must be restarted manually. (Refer to section 4.3.1.1. 'Start Up in Normal AC Mode'.)

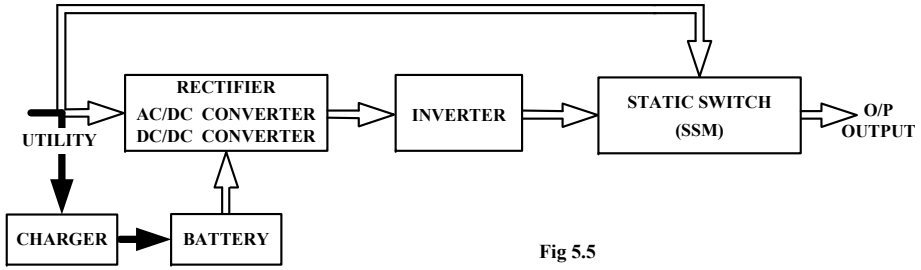


Fig 5.5

5.6. *Overheating*

If the UPS overheats when the utility is normal it will switch into bypass mode. The UPS will switch back to inverter mode when the overheating is eliminated. If overheating occurs when the utility is abnormal the buzzer will beep continuously and the Fault LED ⚠ will shine. The UPS will cut off supply to the loads.

5.7. *Inverter Current or Voltage Out of Tolerance*

If the UPS inverter delivers over-current or out-of-tolerance voltage to its outlets then the UPS is out of order. The UPS will switch into bypass mode when the utility is normal. The Utility ~ LED, Bypass ⤳ LED, and Fault ⚠ LED will shine.

If these two fault conditions occur when the utility is abnormal the UPS will cut off the supply to its outlets, and the Fault ⚠ LED will shine.

6. Maintenance Guide

6.1. *Troubleshooting*

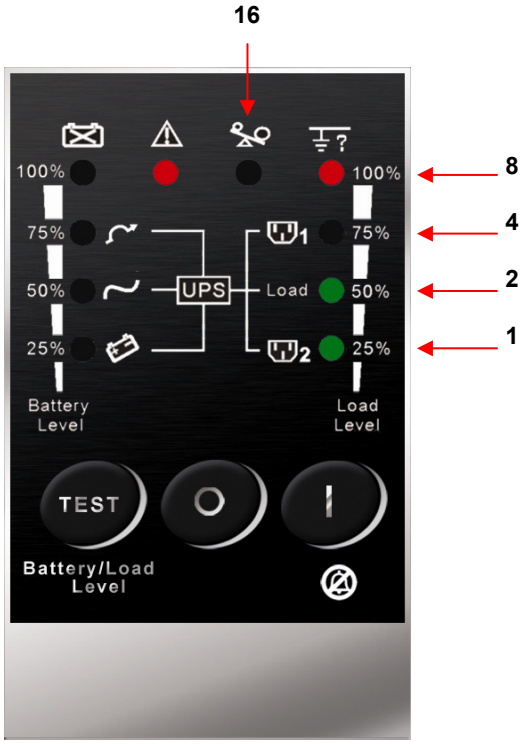
If the UPS malfunctions during operation please check that all lines are connected properly and that the utility specifications are correct. Then check the table below for solutions. Should the problem persist please contact your local dealer for assistance.

Situation	Check Items	Solution
Fault ⚠ LED Read the error code (see next page) displayed by the combination of LEDs, and verify the fault as follows.	1. Er05,Er24	1. Check for proper battery connection. Measure battery voltage to ensure that batteries are charged and healthy. Recharge batteries for 8 hours if necessary. Simulate utility outage to verify that UPS is able to provide DC backup. Otherwise consult your local dealer right away.
	2. Overload	2. Disconnect some non-critical loads from the UPS output until the overload ceases. Check if there is any short circuit between cables due to broken cable insulation. Replace the cables if necessary.
	3. Er11 (UPS Over Temperature)	3. Remove any objects obstructing the ventilation louvers. Verify that the cooling fans are working properly. Contact your local dealer to replace the fans if necessary.
	4. Site wiring/Ground fault	4. Check if the "L" and "N" phases of the utility AC source have been wrongly wired or if the Ground-Neutral voltage exceeds the limits.
	5. Er14 (Fans out of order)	5. Verify that the ventilating fans are functioning properly. Do not attempt to replace the fans yourself. Contact your local dealer for replacement.
	6.Other error codes	6. Consult your local dealer for assistance.

UPS fails to provide battery backup or its backup time is shorter than its intended performance.		If the backup time remains unsatisfactory after 8 hours of charging please contact your local dealer for battery replacement.
UPS is normal, but there is no output to the load.	Check that all power cords are properly connected.	If the problem persists consult your local dealer for technical assistance.
The UPS switches into battery mode and then back into utility mode when a connected device is turned on, or the UPS switches back and forth between battery and utility modes.	1. A power strip is connected to the UPS. See if there is any damage to the utility wall receptacle or if the cord plug is faulty.	1. Do not use the power strip. 2. Replace the wall receptacle/cord plug.
Strange noise or smell		Immediately shut down the whole system. Disconnect the power from the UPS and call for service.
UPS is unable to provide backup power.		Check that the battery connectors are fully engaged. Allow the batteries to recharge if they are weak. If the problem persists after recharging replace the batteries. If the problem still persists consult your local dealer for technical assistance.

Error Codes

When the Fault LED ⚠ is lit press the ON button ‘ ’ briefly to check the error code. The error codes 1, 2, 4, 8, and 16 are represented by the four bar LEDs 25%, 50%, 75%, and 100%, and the Overload LED . Each LED represents a number as shown in the figure below. For example, the figure below shows the 25%, 50%, and 100% bar LEDs lit. The error code is therefore 8 + 2 + 1 = 11, or Er11, which indicates that the UPS is over-temperature.



6.2. *Error Codes and Their Meanings*

Code	Meaning
Er05	Battery weak or faulty
Er06	Output short-circuited
Er07	EPO mode
Er11	UPS over-temperature
Er12	Inverter overload
Er24	Utility low（< 160 V）or battery disconnected
Er28	Bypass overload

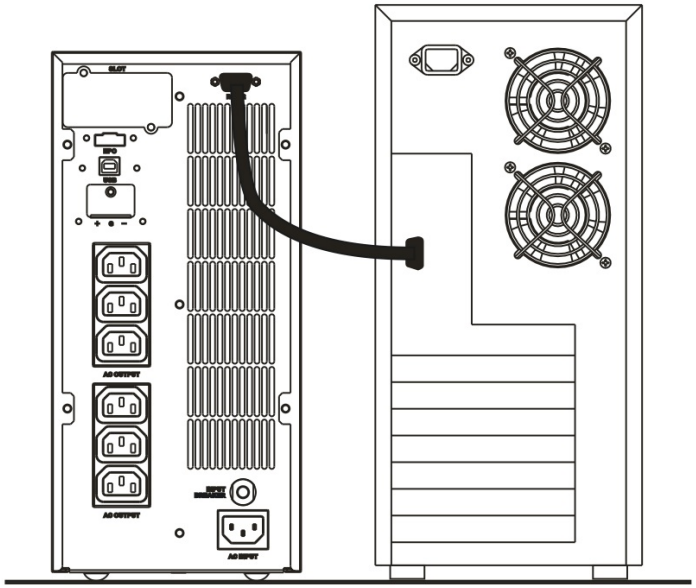
6.3. *Maintenance*

1. Clean the dust from the ventilation openings and intakes on the rear panel.
2. Turn off the UPS and wipe the casing with a damp cloth. Be careful to avoid getting water in the UPS.
3. Periodically unplug the power cord of the UPS from the wall receptacle to test the condition of the batteries. Be sure you have saved your data in any open computer applications before you proceed with this battery test.

7. Communication Software

7.1. *Hardware Setup*

1. Decide whether to use RS-232 communication or USB communication. (For optional interface cards please refer to Chapter 8.)
2. Connect a male RS-232 connector or a USB cable* to the UPS communication port. Connect the female RS-232 connector or the other end of the USB cable to the computer.



***Note: RS-232 and USB cables are optional.**

7.2. *Software Installation*

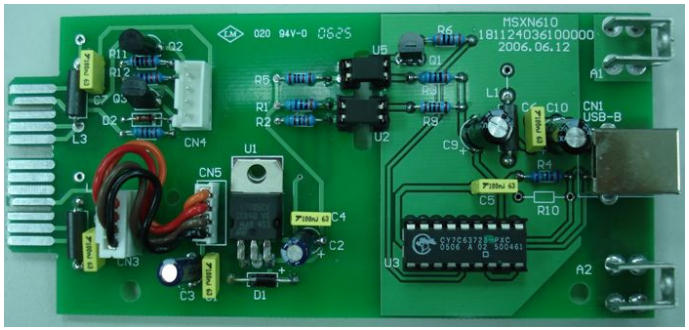
Please refer to the software user's manual.

8. Optional Communication Cards

8.1. *R2E (second RS-232) card*

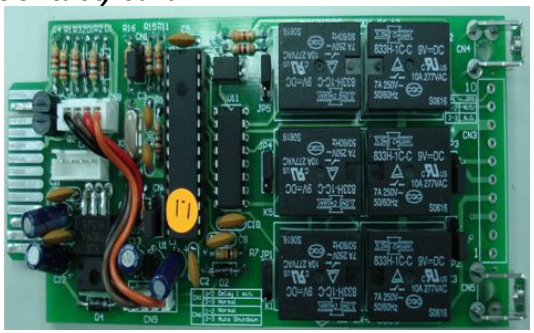
8.1.1. CN1 is for RS-232 DB9.
8.1.2. For interface settings and pin assignments please refer to section 3.4.1.
8.1.3. Installation Position: Optional Slot

8.2. *USE (USB) card*



8.2.1. CN1 is for USB.
8.2.2. For the communicaiton protocol definition please refer to section 8.4.3.
8.2.3. Installation Position: Optional Slot

8.3. *DCE (Dry Contact) card*



8.3.1. Pin assignments of 10-Pin terminal:

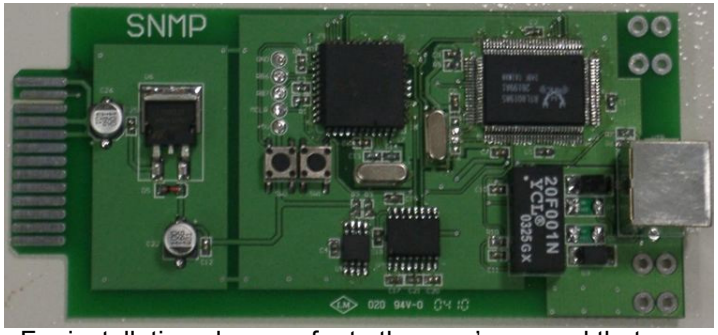
1	2	3	4	4	5	6	7	8	9	10

1 → UPS in Bypass mode (Bypass)
2 → Utility Normal (normally closed contact)
3 → Utility Normal (normally open contact)
4 → Inverter On
5 → Battery Low
6 → Battery Bad or Abnormal
7 → UPS Alarm
8 → Common
9 → Shutdown UPS positive (+) signal
10 →Shutdown UPS negative (-) signal

8.3.2. The shutdown function will be activated after +6-25 VDC is applied between pin 9 and pin 10 for 5 seconds.
8.3.3. The capacity of each relay contact is 40 VDC/25 mA.
8.3.4. Installation Position: Optional Slot
8.3.5. Flexible signal output for N.C. (Normally Closed) or N.O. (Normally Open) contact by shorting pins1-2 or pins 2-3 from JP1-5
8.3.6. The shutdown function will be enabled 1 minute after blackout occurs if pins 1-2 of both CN1 and CN6 are shorted. Otherwise the shutdown function can be enabled only by pins 9-10 of CN3 if pins 2-3 of both CN1 and CN6 are shorted.

8.4. *SNMP Cards*

8.4.1. SNMP/Web card



8.4.1.1 For installation please refer to the user's manual that came with the card.

8.4.1.2 Installation Position: Optional slot on rear panel

8.4.2. Megatec SNMP card

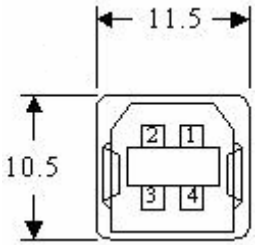
8.4.2.1 For installation please refer to the user's manual that came with the card.

8.4.2.2 Installation Position: Optional slot on rear panel

8.4.3. USB

The USB communication protocol definition is as below.

1. Complies with USB version 1.0, 1.5 Mbps.
2. Complies with USB HID version 1.0.
3. Pin Assignments:



1 → VCC (+5V)
2 → D－
3 → D＋
4 → Ground

8.4.4. EPO

Pin Assignments:

1	2

1 → EPO+
2 → Ground

To enable the EPO function short pins 1 and 2.

9. Specifications

MODEL	ITEM		1K	2K	3K
CAPACITY	VA / W		1000 VA/700 W	2000 VA/1400 W	3000 VA/2100 W
INPUT	Voltage Rating		110/140/160-300 VAC (Based on load percentage 0-25% / 25-50% / 50-100%)		
	Frequency Rating		45-65 Hz		
	Phase		Single phase with ground		
	Power Factor		≧ 0.98 (with full linear load)		
	Generator Input		Supported		
	Input Connection		10 A, IEC 320-C14	10 A, IEC 320-C14	16 A, IEC 320-C20
Output	Voltage		230 V, adjustable to 200/208/220/230/240		
	Voltage Regulation		within ±1% until low-battery warning		
	Frequency (Synchronized Range)		3 Hz or 1 Hz (selectable)		
	Frequency (Battery Mode)		50/60 Hz ±0.1% unless synchronized to line		
	Current Crest Ratio		3:1		
	Harmonic Distortion		< 3% at full linear load < 7% at full non-linear load		
	Output Waveform		Pure sine wave		
	Outlets		(3) 10 A, IEC 320-C13	(6) 10 A, IEC 320-C13	(6) 10A, IEC 320-C13
	Overload capacity	Line mode	＜105% continuous 106-120% for 30 seconds transfer to bypass 121-150% for 10 seconds transfer to bypass ＞150% Immediately transfer to bypass. Buzzer continuously alarms.		
		Battery mode	＜105% continuous 106-120% for 30 seconds shuts down 121-150% for 10 seconds shuts down ＞150% Immediately shuts down. Buzzer continuously alarms.		
		Bypass mode	＜105% continuous 106-120% for 250 seconds shuts down 121-130% for 125 seconds shuts down 131-135% for 50 seconds shuts down 136-145% for 20 seconds shuts down 146-148% for 5 seconds shuts down 149-157% for 2 seconds shuts down 158-176% for 1 seconds shuts down 177-187% for 0.32 seconds shuts down ＞188% for 0.16 seconds shuts down. Buzzer continuously alarms.		

Efficiency	Line mode		90%	90%	90%
	Battery mode		85%	85%	85%
	ECO mode		96%	96%	96%
Battery	Number of batteries		2	4	6
	Battery type		12 V/7.2 Ah Sealed, non-spillage, maintenance-free, lead acid		
	Rated Battery Voltage		24 VDC	48 VDC	72 VDC
	Backup time (half load)		> 10 min.	> 10 min.	> 10 min.
	Backup time (full load)		> 3 min.	> 3 min.	> 3 min.
	Charge Current (Max.)	Standard	2.2 A	1.4 A	1 A
		External	8.8 A	11.2 A	8 A
	Recharge time (to 90%)		3hr	3hr	3hr
	Floating Mode Charging Voltage		27.4Vdc±1%	54.8Vdc±1%	82.2Vdc±1%
	Bluk Mode Charging Voltage		30.0Vdc±1%	60.0Vdc±1%	90.0Vdc±1%
	DC leakage current		≤ 30 μA with no AC applied and the unit in the off position		
Transfer time	AC to DC		0 ms		
	Inverter to Bypass		4 ms (Typical)	4 ms (Typical) / 0 ms (Optional)	
DC start			Yes		
Self Diagnostics			By panel button or software control		
Front Panel	LED	Standard	Load Level/Battery Level/ Battery Mode/ Normal Mode/Bypass Mode/ Self-Test/ Weak/Bad Battery/Site Wiring Fault/ Fault/ Overload		
		Optional	Programmable Outlet1/ Programmable Outlet2		
	Button		ON (Alarm Silence)/ OFF (Test/Level Button)		
Audible Alarm	Battery Mode		Sounds once every 1.5 seconds		
	Low Battery		Sounds once every 0.2 seconds		
	Overload		Sounds once every 3 seconds		
	Normal alarm		Sounds once every 3 seconds		
	Fault		Continuous tone		
Protection	Short Circuit		Bypass mode : Fuse Normal Mode : Output Breaker/Electronic Circuit Battery Mode : Output Breaker/Electronic Circuit		
	Battery		ABDM		
	EPO(Optional)		UPS shuts down immediately.		

	Over Temperature	Normal Mode :Transfer to Bypass Mode Battery Mode : UPS shuts down immediately.		
Physical	Dimensions (HxWxD in mm)	236 × 144 × 367	322 × 151 × 444	322 × 189 × 444
	Weight	10kg	16.5kg	22.5kg
Environmental	Operating Temperature	0-40℃		
	Noise Level	＜50 dBA		
	Relative Humidity	0-90% (without condensation)		
Interface	Interface Type	RS-232 port + USB (optional) + EPO (optional)		
	Slots	Dry contact, 2nd R-232, 2nd USB, SNMP/Web Card		
	Compatible Platforms	Microsoft Windows series, Linux, etc.		
Standards and Certifications	Safety	IEC/EN 62040-1-1		
	EMC	IEC/EN 62040-2 class A, IEC/EN 61000-4-2/-3/-4/-5/-6/-8, IEC/EN 61000-2-2, IEC/EN 61000-3-2/-3		
	Markings	CE		

MODEL	ITEM	1K with C	2K with C		3K with C	
CAPACITY	A / W	8.8A/240W	5.6A/300W	11.2A/600W	4A/320W	8A/640W
INPUT	Voltage Rating	110-300 VAC				
	Frequency Rating	50-60 Hz				
	Phase	Single phase with ground				
Battery	Number of batteries	2	4		6	
	Battery type	non-spillage, maintenance-free, lead acid				
	Rated Battery Voltage	24 VDC	48 VDC		72 VDC	
	Charge Current (Max.)	8.8 A	5.6 A	11.2 A	4 A	8 A
	Floating Mode Charging Voltage	27.4Vdc±1%	54.8Vdc±1%		82.2Vdc±1%	
	Bluk Mode Charging Voltage	30.0Vdc±1%	60.0Vdc±1%		90.0Vdc±1%	
	DC leakage current	≤ 30 μA with no AC applied and the unit in the off position				
Physical	Dimensions (HxWxD in mm)	236×144×367	322 × 151 × 444		322 × 189 × 444	
	weight	5.8kg	8.7kg	9.5kg	9.6kg	10.4kg

Protection	Over Temperature Protect	NO
	Over Voltage Protect	YES
	Over Current Protect	YES
Environmental	Operating Temperature	0-40℃
	Noise Level	＜60 dBA
	Relative Humidity	0-90% (without condensation)

* The UPS communication software may be downloaded from the Ablerex Web site at:
http://www.ablerex.com.tw/tw/htm/support-sl.htm

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